

U.S. Serial No. 09/900,068  
Attorney Docket No. GJH-0102  
Family No. P1996J056B  
Response to 1st Office Action after RCE dated 02/23/04

### REMARKS

Applicants acknowledge that their February 3, 2004 submission has been entered and their request for continued examination accepted.

### CLAIM REJECTIONS

#### FIRST REJECTION UNDER 35 U.S.C. 103

Claims 1-9 and 12-19 have been rejected under 35 U.S.C. 103(a) as being obvious in light of United States Patent Number 5,316,658, Ushio et al. ("Ushio").

#### EXAMINER'S POSITION

The Examiner takes the position that Ushio discloses a process for removing sulfur and nitrogen from a petroleum distillate comprising contacting the feed with hydrogen in first reaction zone to produce a first reaction zone effluent having a sulfur content of 0.05 wt.% (500wppm) or lower. The first reaction zone may employ a Co-Mo catalyst having a total amount of metals ranging from 1 to 30% by weight, and countercurrent flow may be used. A Ni-Mo on alumina catalyst is specifically disclosed as an effective second zone catalyst. The Examiner also summarizes the first and second reaction zone conditions.

The Examiner points out that Ushio a) does not disclose the claimed feed; b) does not disclose the metals concentrations of the catalysts; and c) does not disclose the

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specific catalytic metals. The Examiner also notes that Ushio is silent as to an additional reaction zone following the second reaction zone.

Thus, the Examiner has cited Trachte. The Examiner states that Trachte discloses the hydrocracking of a petroleum distillate that has been previously hydrotreated in a two-stage hydrotreating process. The Examiner thus takes the position that it would have been obvious to one having ordinary skill in the art to have modified the process of Ushio by utilizing the claimed feeds.

The Examiner continues that the metals concentrations and amounts would have also been obvious in light of Ushio, that all of these features would have been obvious to one having ordinary skill in the art and knowledge of Ushio. Specifically, the Examiner states that it would have been obvious to modify the first zone catalyst of Ushio to within the presently claimed ranges because any concentration of the individual metals that would fall within the totals metals range of Ushio would be an effective catalyst.

The Examiner also states that it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the teaching of Ushio by including a cracking step following the second hydrotreating zone as suggested by Trachte.

#### APPLICANT'S POSITION

It is applicants' position that one having ordinary skill in the art and knowledge of Ushio and Trachte at the time the invention was made would not have found it obvious to arrive at the presently claimed invention.

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Ushio teaches a process to produce a fuel oil by hydrotreating stock oil under severe conditions. The stock oil used in the Ushio process is a residue left over from distillation. See Ushio, col. 2, line 55-57. This stock oil has a concentration of the residue, or resid as it is commonly referred to in the art, of more than 70 mass% wherein the distillation temperature of that resid is 300°C or more. This resid is processed through a two stage hydrotreatment process that contains conventional hydrotreating catalysts in both the first and second reaction stages. See Ushio, col. 5, line 26-48, and col. 7, lines 56-67. Thus, applicants take the position that Ushio teaches a two-stage resid hydrotreating process employing conventional hydrotreating catalysts.

Trachte teaches a two stage hydrodesulfurization process wherein the effluent from the second hydrotreating stage is cracked. The first hydrotreating catalyst used in the Trachte process is conventional, and the second hydrotreating catalyst is a noble metal containing zeolite. The catalyst contained in both the second and third reaction stages of Trachte are both conventional hydrocracking catalysts, which are typically "comprised of a Group VIII metal hydrogenating component on a zeolite cracking base". See Trachte, col. 4, line 37-43.

The instantly claimed invention is a multi-stage process for removing sulfur and nitrogen components from distillate boiling range petroleum feedstreams. The process comprises reacting the feedstream in a first hydrotreating reaction stage with a CoMo, supported hydrotreating catalyst. The product from the first reaction stage is then reacted in a second hydrotreating reaction stage with counterflowing hydrogen-containing treat gas in the presence of a bed of catalyst comprised of Ni and one or both of a metal

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selected from Mo and W. The liquid product from the second hydrotreating reaction stage is reacted in at least one additional reaction stage wherein said at least one additional reaction stage is selected from the group consisting of an aromatics hydrogenation stage and a hydrocracking reaction stage.

Thus, applicants take the position that it would not have been obvious to modify the Ushio process to use the presently claimed feeds. As stated above, Ushio teaches that suitable feeds for use therein are residues, or resids, left over from distillation processes, and the presently claimed invention utilizes distillate boiling range feedstreams. One having ordinary skill in the art would not find it obvious to use a feed boiling in the distillate range in a process designed for upgrading resid boiling range feedstreams.

Applicants also take the position that any modification of the Ushio reference including metals content, etc. would not obviate the presently claimed invention. As stated above, one having ordinary skill in the art would not be motivated to utilize a distillate boiling range feed in a process designed to produce a fuel oil base from atmospheric residue. Further, Ushio lacks the required teaching of an additional reaction stage following the second hydrotreating stage therein.

Applicants further take the position that the combination of Ushio and Trachte does not obviate the presently claimed invention. As stated above, the Trachte reference includes a hydrocracking stage following two hydrotreating stages. However, the second of these hydrotreating reaction stages uses a conventional hydrocracking catalyst as the second "hydrotreating" catalyst. Thus, one would not be motivated to combine the teachings of Ushio and Trachte. One would not have been taught to utilize the

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hydrocracking stage of Trachte with the Ushio process because there is no disclosure in Ushio to include such a stage. Further, Trachte teaches that the second "hydrotreating" catalyst must be comprise a Group VIII metal noble metal containing zeolite supported catalyst. This is the only catalyst disclosed as a suitable catalyst in the second reaction stage of Trachte. One having ordinary skill in the art and knowledge of Trachte and Ushio would not have found it obvious to utilizes the cracking stage of Trachte after the second hydrotreating stage of Ushio, which employs a conventional hydrotreating catalyst, because there is no teaching in either patents that this process sequence is desired or beneficial.

Further, Trachte discloses that the process disclosed therein can be applicable to petroleum distillate feedstocks. However, Ushio discloses that suitable feeds for use therein are residuals from atmospheric distillation, i.e. resids. One having ordinary skill in the art would not be motivated to combine the teachings of a process that is taught to be suited for the treatment of resids, i.e. Ushio, with another process that is used to process and treat petroleum distillate feedstocks, i.e. Trachte.

Thus, it is applicants' position that one having ordinary skill in the art and knowledge of Ushio and Trachte, alone or in combination, would not have found the present invention obvious. One would not have been taught to include an additional reaction stage selected from the group consisting of an aromatics hydrogenation stage and a hydrocracking reaction stage in the Ushio process. One having ordinary skill in the art would not have found it obvious to modify a residue upgrading process to utilize feeds as are presently claimed, and also would not have found it obvious to modify the residue

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upgrading process with teachings from another process designed to treat petroleum distillates, i.e. Trachte.

The Examiner is requested to reconsider and withdraw this rejection.

#### **SECOND REJECTION UNDER 35 U.S.C. 103**

Claims 11 and 21 have been rejected under 35 U.S.C. 103(a) as being obvious in light of United States Patent Number 5,888,379, Ushio et al. ("Ushio") and United States Patent Number 5,198,099, Trachte et al. ("Trachte"), as applied above, and further in view of United States Patent Number 3,425,810, Scott ("Scott").

#### **EXAMINER'S POSITION**

The Examiner again states that Ushio does not disclose an additional reaction zone following the second reaction zone. However, the Examiner cites Trachte as disclosing the hydrocracking of a petroleum distillate that has been previously hydrotreated in a two-stage hydrotreatment process. Thus, the Examiner states that it would have been obvious to modify the process of Ushio to include the hydrocracking stage of Trachte.

The Examiner cited that Scott reference as disclosing a vapor passageway similar to that claimed in instant claims 11 and 21.

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### APPLICANT'S POSITION

It is applicants' position that one having ordinary skill in the art and knowledge of Ushio, Trachte, and Scott at the time the present invention was made would not have found it obvious to arrive at the presently claimed invention. Claims 11 and 21 are dependent claims and by definition include all of the limitations of the claims from which they depend. Therefore, claim 11 and 21 include all of the limitations of novel, independent Claims 1, and 12, respectively.

As stated above Ushio teaches a process to produce a fuel oil by hydrotreating stock oil under severe conditions. The stock oil used in the Ushio process is a residue left over from distillation. See Ushio, col. 2, line 55-57. This stock oil has a concentration of the residue, or resid as it is commonly referred to in the art, of more than 70 mass% wherein the distillation temperature of that resid is 300°C or more. This resid is processed through a two stage hydrotreatment process that contains conventional hydrotreating catalysts in both the first and second reaction stages. See Ushio, col. 5, line 26-48, and col. 7, lines 56-67. Thus, applicants take the position that Ushio teaches a two-stage resid hydrotreating process employing conventional hydrotreating catalysts.

Trachte teaches a two stage hydrodesulfurization process wherein the effluent from the second hydrotreating stage is cracked. The first hydrotreating catalyst used in the Trachte process is conventional, and the second hydrotreating catalyst is a noble metal containing zeolite. The catalyst contained in both the second and third reaction stages of Trachte are both conventional hydrocracking catalysts, which are typically

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"comprised of a Group VIII metal hydrogenating component on a zeolite cracking base".

See Trachte, col. 4, line 37-43.

The instantly claimed invention is a multi-stage process for removing sulfur and nitrogen components from distillate boiling range petroleum feedstreams. The process comprises reacting the feedstream in a first hydrotreating reaction stage with a CoMo, supported hydrotreating catalyst. The product from the first reaction stage is then reacted in a second hydrotreating reaction stage with counterflowing hydrogen-containing treat gas in the presence of a bed of catalyst comprised of Ni and one or both of a metal selected from Mo and W. The liquid product from the second hydrotreating reaction stage is reacted in at least one additional reaction stage wherein said at least one additional reaction stage is selected from the group consisting of an aromatics hydrogenation stage and a hydrocracking reaction stage.

Thus, applicants take the position that it would not have been obvious to modify the Ushio process to use the presently claimed feeds. As stated above, Ushio teaches that suitable feeds for use therein are residues, or resids, left over from distillation processes, and the presently claimed invention utilizes distillate boiling range feedstreams. One having ordinary skill in the art would not find it obvious to use a feed boiling in the distillate range in a process designed for upgrading resid boiling range feedstreams.

Applicants also take the position that any modification of the Ushio reference including metals content, etc. would not obviate the presently claimed invention. As stated above, one having ordinary skill in the art would not be motivated to utilize a distillate boiling range feed in a process designed to produce a fuel oil base from

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atmospheric residue. Further, Ushio lacks the required teaching of an additional reaction stage following the second hydrotreating stage therein.

Applicants further take the position that the combination of Ushio and Trachte does not obviate the presently claimed invention. As stated above, the Trachte reference includes a hydrocracking stage following two hydrotreating stages. However, the second of these hydrotreating reaction stages uses a conventional hydrocracking catalyst as the second "hydrotreating" catalyst. Thus, one would not be motivated to combine the teachings of Ushio and Trachte. One would not have been taught to utilize the hydrocracking stage of Trachte with the Ushio process because there is no disclosure in Ushio to include such a stage. Further, Trachte teaches that the second "hydrotreating" catalyst must be comprise a Group VIII metal noble metal containing zeolite supported catalyst. This is the only catalyst disclosed as a suitable catalyst in the second reaction stage of Trachte. One having ordinary skill in the art and knowledge of Trachte and Ushio would not have found it obvious to utilizes the cracking stage of Trachte after the second hydrotreating stage of Ushio, which employs a conventional hydrotreating catalyst, because there is no teaching in either patents that this process sequence is desired or beneficial.

Further, Trachte discloses that the process disclosed therein can be applicable to petroleum distillate feedstocks. However, Ushio discloses that suitable feeds for use therein are residuals from atmospheric distillation, i.e. resids. One having ordinary skill in the art would not be motivated to combine the teachings of a process that is taught to

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be suited for the treatment of resids, i.e. Ushio, with another process that is used to process and treat petroleum distillate feedstocks, i.e. Trachte.

Thus, it is applicants' position that one having ordinary skill in the art and knowledge of Ushio and Trachte, alone or in combination, would not have found the present invention obvious. One would not have been taught to include an additional reaction stage selected from the group consisting of an aromatics hydrogenation stage and a hydrocracking reaction stage in the Ushio process. One having ordinary skill in the art would not have found it obvious to modify a residue upgrading process to utilize feeds as are presently claimed, and also would not have found it obvious to modify the residue upgrading process with teachings from another process designed to treat petroleum distillates, i.e. Trachte.

Based on the preceding arguments, the Examiner is requested to reconsider and withdraw all rejections and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted:

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